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(12) # EUROPEAN PATENT SPECIFICATION

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Fig. 14 is a perspective view showing a mounting plate 71b in another embodiment for being mounted to the sanding apparatus 10b; and
Fig. 15 is a perspective view showing a mounting plate 71c in a still another embodiment for being mounted to the sanding apparatus 10b.

Preferred embodiments of the invention will now be described in detail with reference to the drawings.

Fig. 2 is an exploded perspective view of a sanding apparatus 10 representing one embodiment of the invention. Referring to Fig. 2, the sanding apparatus 10 includes a body 11 to be held by the operator during a sanding operation, a drive shaft 12 housed in the body 11, and a mounting plate 13 mounted to the drive shaft 12.

The body 11 is generally L-shaped and has a drive power source 40, such as a motor- or compressed air-powered rotor. The body 11 has at one lengthwise end thereof a mounting hole 14 having an axis perpendicular to the longitudinal direction of the body 11, and the drive shaft 12 which will be further described hereinafter is housed in the mounting hole 14 in coaxial relation therewith. The housed drive shaft 12 is connected to said drive power source 40 by which it is driven to rotate. An electric cord or air pipe for the drive power source 40 is connected to the other end of the body 11.

The body 11 also has a cylindrical locking hole 16 which constitutes a rotary motion blocking means 15 for blocking the rotation of the mounting plate 13 which will be further described hereinafter. The axis of the locking hole 16 is perpendicular to the longitudinal direction of the body 11 and parallel to the axis of the mounting hole 14, said locking hole 16 being open codirectionally with the mounting hole 14 and at a position more adjacent the lengthwise directional center of the body 11 than the location of the mounting hole 14. The locking hole 16 receives thereinto a locking projection 17, another constituent of said rotary motion blocking means 15, which will be described hereinafter.

As above mentioned, the drive shaft 12 is connected to the drive power source 40 at its one end at which it is inserted in the body 11. At the other end of the drive shaft 12 there is integrally formed a mounting member 18 in coaxial relation with the drive shaft 12. The mounting member 18 has a mounting hole 19 formed as a peripheral cam for mounting a bearing 20 as a follower, the axis of said mounting hole 19 being parallel to the axis of the drive shaft 12 in eccentric relation therewith. The bearing 20 is internally threaded at it center to form a threaded hole 21 into which the mounting plate 13 to be hereinafter further described is threadly fitted by a bolt 22.

The mounting plate 13 comprises a base plate 23 made of a metal material shaped in a plate, a resilient member 24 made of sponge, rubber or the like which is fixed to one side of the base plate 23, and a surface member 25 comprised of, for example, synthetic leather, which is fixedly placed on the resilient member 24. An abrasive member 26, such as sandpaper, if removably mounted with an adhesive on the surface member 25. The resilient member 24 mounted on the base plate 23 permits the abrasive member 26 to adapt itself for the configuration of the surface being sanded, so that uniform sanding can be effectively performed. Further, the surface member 25 of synthetic leather or the like permits easy removal of the abrasive member 26 from the surface member 25 and accordingly easy replacement of the abrasive member 26. At a lengthwise directional center location on the mounting plate 13 having the resilient member 24 and the surface member 25 placed in layers, there is formed an embedding hole 27 for embedding therein the head of the bolt 22 for securing the mounting plate 13 in the bearing 20, whereby the surface to be sanded is prevented from being damaged by the bolt head in the course of a sanding operation. Further, an insertion hole 29 for the bolt 22 is provided in the base plate 23 at a lengthwise directional center portion thereof.

On the other side surface of the base plate 23 of the mounting plate 13, the locking projection 17 as one constituent of the rotary motion blocking means 15 for blocking the rotation of the mounting plate 13 is fixed in position perpendicularly to the lengthwise direction of the base plate 23. The locking projection 17 is formed of a resilient material, such as hard rubber or the like, and is generally column shaped. On the free end side top of the locking projection 17 there is fixed a metal made thin plate 28 of disc shape, whereby the free end portion of said locking projection 17 as inserted in said locking hole 16 is prevented from being damage during operation of the sanding apparatus 10. As already mentioned, the rotation of the mounting plate 13 is prevented by the locking projection 17 being inserted into the locking hole 16, and in this conjunction it is noted that the inner diameter $\ell 1$ of the locking hole 16 is set larger than the inner diameter $\ell 2$ of the locking projection 17, there being still provided some degree of play. By virtue of the above described arrangement, the mounting plate 13 is mounted so that the mounting plate 13 and the body 11 are positioned parallel in their lengthwise direction.

Fig. 3 is a view illustrating the manner of operation of the mounting plate 13, Fig. 4 is a view showing the mounting plate 13 as seen when an obstacle 30 is present alongside the plate 13, and Fig. 5 is a schematic view showing a trajectory of

such configuration having two parallel flat portions and arcuate portions formed at both ends of the parallel flat portions. The locking hole 35 is rotatable about its axis so that it may be longitudinally oriented in any desired direction.

Fig. 7 is a view showing trajectories of the lengthwise directional front end A of the mounting plate 13 as seen when the longitudinal position of the locking hole 35 is varied in two ways. As Fig. 7 (1) shows, for example, where the locking hole 35 is positioned longitudinally parallel to the body 11 of the sanding apparatus 10, the movement of the locking projection 17 in a direction perpendicular to the longitudinal direction of the locking hole 35 is prevented but it is movable in the longitudinal direction of the locking hole 35. Therefore, the trajectory of the front end A of the mounting plate 13 represents a generally elliptic pattern of movement as shown by a two dot chain line D in Fig. 7 (1) wherein the distance of movement of the mounting plate 13 in its longitudinal direction is equal to the diameter of the trajectory of rotary movement of the center of the bearing 20, whereas the distance of movement of the mounting plate 13 in a direction perpendicular to its longitudinal direction is about two times said diameter. Where the locking hole 35 is longitudinal perpendicular to the longitudinal direction of the body 11, as Fig. 7 (2) shows, the trajectory of said front end A represents such a generally elliptic pattern as shown by a two dot chain line E in Fig. 7 (2), similarly to the above case, so that the movement of the mounting plate 13 can be changed simply by changing the longitudinal position of the locking hole 35. Therefore, it is possible to select such movement of the mounting plate 13 as is most suitable with respect to the surface to be sanded, by changing the longitudinal direction of the locking hole 35, thus enabling the operator to perform sandning operation at ease and assuring improved operating efficiency.

In the above described embodiment, the locking hole 35 has parallel portions and a generally oval shaped section perpendicular to its axis, but the section perpendicular to the axis may be of a generally ellipic configuration.

Fig. 8 is an exploded perspective view of a sanding apparatus 10a representing a still another embodiment of the invention. In this embodiment, parts similar or corresponding to those in the above described embodiments are designated by the like reference numerals or characters. In each of the preceding embodiments, the locking hole 16 is disposed more adjacent to a median position than the mounting hole 14 as viewed in the longitudinal direction of the body 11, but in this embodiment the locking hole 16 is disposed adjacent but outwardly (rightward in Fig. 8) of the mounting hole 14 in the longitudinal direction of the body 11.

The mounting plate 13 has a locking projection 17 formed centrally in the longitudinal direction thereof and on the base plate 23 side, said mounting plate 13 being fitted into said locking hole 16. At a location adjacent one lengthwise directional side of the mounting plate 13 there is formed a threaded hole 29 which is threadedly fixed to the bearing 20 by the bolt 22.

According to such arrangement, as is the case with the first embodiment, the mounting plate 13 can perform reciprocating movement in the longitudinal direction thereof if any unremovable obstacle 30 is present on the surface to be sanded.

Fig. 9 is a perspective view showing a sanding apparatus 10b representing still another embodiment of the invention and Fig. 10 is an exploded perspective view thereof. The sanding apparatus 10b of this embodiment comprises a body 51, and a longitudinal rod like handle 52 connected to the body 51. The body 51 has a generally right circular cylinder shaped first body portion 53 and a second body portion 54 formed integrally with the first body portion 53. The first body portion 53 has a housing hole 55 defined therein which extends through said body portion 53 in the axial direction thereof, a pneumatic motor being housed in said hole 55. One end side opening of the housing hole 55 is closed by a cover member 56 fixed to the first body portion 53. A mounting member 57 is connected to a drive shaft extending from the pneumatic motor, said mounting member 57 being rotatable about the rotation axis thereof. The mounting member 57 has a mounting hole 58 having an axis eccentric to its rotation axis, a bearing 59 being housed in the mounting hole 58. The bearing 59 has an internally threaded hole 60.

The second body portion 54 has a housing hole 61 continuted to the housing hole 55 of the first body portion 53, there being housed rotary movement blocking means 62 in said housing hole 61. The rotary movement blocking means 62 include a right circular cylinder shaped outer cylinder member 63 comprised of a resilient material, such as rubber, and a column shaped core member 64 having a slightly smaller outer diameter than the inner diameter of the outer cylinder member 63. The core member 64 is comprised of same material as the outer cylinder member 63, its base portion being fixed to the second body portion 54. A screw rod 65 having an externally threaded periphery is fixed to the free end of the core member 64, said rod 65 extending outwardly from the outer cylinder member 63. A connecting piece 70 is removably mounted to said body 61, and on the connecting piece 70 there is fitted a mounting plate 71a.

A cover 72 having a generally right circular cylinder shape is fitted on the handle 52 connected

3. A sanding apparatus (10, 10a; 10b) as claimed in claim 2, characterized in that said locking projection (17) is made of resilient material.

4. A sanding apparatus (10, 10a; 10b) as claimed in any one of the preceding claims, characterized in that the cross-section of the locking hole (16) rectangular to the axis of the locking hole (16) is a circle or at least a closed curve which over the entire periphery thereof is convex outward in the radial direction.

5. A sanding apparatus (10, 10a; 10b) as claimed in any one of the preceding claims, characterized in that the follower (20) is fixed between the front end portion (A) of the plate member (13) and the locking projection (17).

6. A sanding apparatus (10, 10a; 10b) as claimed in any one of the claims 1-4, characterized in that the locking projection (17) is provided between the front end portion (A) of the plate member (13) and the position of the follower (20) which is fixed to the plate member (13).

7. A sanding apparatus (10, 10a; 10b) as claimed in claim 1, characterized by said plate member (71a, 71b, 71c) being provided at the side thereof facing away from said sanding member (94) with a concave locking portion (88, 89), a connection member (70) being provided having a locking portion (86, 87) to be locked on said concave locking portion (88, 89) of said plate member (71a, 71b, 71c), said body (51) being removably attachable to said connection member (70), said peripheral cam (57) being rotatably housed in said body (51), said follower (59) being fixed in said connection member (70), and said connection member (70) being fixed to said rotary motion blocking means (62).

8. A sanding apparatus (10b) as claimed in claim 7, characterized in that said plate member (71a, 71b, 71c) is removably attached to said connection member (70).

9. A sanding apparatus as claimed in claim 7 or 8, characterized in that said rotary motion blocking means (62) include an outer cylinder member (63) being shaped as a right circular cylinder and fixed to the body (51) and a core member (64) having a smaller outer diameter than an inner cylinder member of said outer cylinder member (63) and housed in said outer cylinder member (63), said core member being displaceable in said outer cylinder member (63).

10. A sanding apparatus as claimed in claim 6, characterized in that said core member (64) is made of resilient material.

11. A sanding apparatus as claimed in claim 6 or 7, characterized in that the driving power source (40) is a pneumatic motor.

12. A sanding apparatus as claimed in claim 6, characterized in that the body (51) is provoded with a handle (52) having an axis perpendicular to the axis of the body (51) and in the free end portion of the handle (52) there are mounted a joint port (73) for supplying compressed air to the driving power source and a discharge port (66) for exhausting air from the driving power source.

Patentansprüche

1. Eine Schleifmaschine (10, 10a; 10b), mit einem Plattenelement (13), das auf einer seiner Oberflächen mit einem Schleifelement (26; 94) versehen ist, das auf eine zu schleifende Oberfläche weist, und einem Körper (11; 51), in dem eine mit einer Antriebsleistungsquelle (40) verbundene Antriebswelle (12) untergebracht ist, welche um eine Achse drehbar ist, wobei an der Antriebswelle (12) eine Steuernocke (19, 57) befestigt ist und wobei am Plattenelement (13) eine Kurvenrolle (20; 59) befestigt und in Anschlag an einer Nockenfläche der Steuernocke drehbar ist, wobei die Kurvenrolle (20) ein Drehzentrum besitzt, dadurch gekennzeichnet, daß die Mittellinie der Antriebswelle zur Schleiffläche senkrecht ist und daß eine Drehbewegungs-Blockierungseinrichtung (15; 62) von der Drehantriebseinrichtung in seitlicher Richtung versetzt zwischen dem Körper (11; 51) und dem Plattenelement (13; 71a, 71b, 71c) vorgesehen ist.

2. Eine Schleifmaschine (10, 10a; 10b) gemäß Anspruch 1, dadurch gekennzeichnet, daß die Drehbewegungs-Blockierungseinrichtung (15) versehen ist mit einem Blockierungsvorsprung (17) auf derjenigen Seite des Plattenelements (13), die von der mit dem Schleifelement (26) versehenen Seite abgewandt ist, und einem Blockierungsloch (16), das so beschaffen ist, daß es den Blockierungsvorsprung (17) lose aufnimmt, und am Körper (11) vorgesehen ist.

3. Eine Schleifmaschine (10, 10a; 10b) gemäß Anspruch 2, dadurch gekennzeichnet, daß der Blockierungsvorsprung (17) aus elastischem Material hergestellt ist.

4. Appareil à poncer (10, 10a ; 10b) selon l'une des revendications précédentes, caractérisé par le fait que la section du trou de blocage (16) perpendiculaire à l'axe de celui-ci est un cercle ou au moins une courbe fermée qui est convexe extérieurement dans la direction radiale sur toute sa périphérie.

5. Appareil à poncer (10, 10a ; 10b) selon l'une des revendications précédentes, caractérisé par le fait que le galet (20) est fixé entre la partie extrême avant (A) de l'élément plaque (13) et la salle de blocage (17).

6. Appareil à poncer (10, 10a ; 10b) selon l'une des revendications 1 à 4, caractérisé par le fait que la saillie de blocage (17) est prévue entre la partie extrême avant (A) de l'élément plaque (13) et la position du galet (20) qui est fixé à l'élément plaque (13).

7. Appareil à poncer (10, 10a ; 10b) selon la revendication 1, caractérisé par le fait que l'élément plaque (71a, 71b, 71c) est pourvu sur sa face opposée à l'élément ponceur (94) d'une partie concave de blocage (88, 89), qu'il est prévu un élément de liaison (70) ayant une partie de blocage (86, 87) destinée à être bloquée sur la partie concave de blocage (88, 89) de l'élément plaque (71a, 71b, 71c), que le corps (51) peut être fixé de manière amovible à l'élément de liaison (70), que la came périphérique (57) est montée tournante dans le corps (51), que le galet (59) est fixé dans l'élément de liaison (70), et que l'élément de liaison (70) est fixé aux moyens de blocage de rotation (62).

8. Appareil à poncer (10b) selon la revendication 7, caractérisé par le fait que l'élément plaque (71a, 71b, 71c) est fixé de manière amovible à l'élément de liaison (70).

9. Appareil à poncer selon l'une des revendications 7 et 8, caractérisé par le fait que les moyens de blocage de rotation (62) comportent un élément cylindrique extérieur (63) ayant la forme d'un cylindre circulaire droit et fixé au corps (51) et un élément central (64) ayant un plus petit diamètre extérieur qu'un élément cylindrique intérieur de l'élément cylindrique extérieur (63) et logé dans l'élément cylindrique extérieur (63), cet élément central étant déplaçable dans l'élément cylindrique extérieur (63).

10. Appareil à poncer selon la revendication 6, caractérisé par le fait que l'élément central (64) est en matière élastique.

11. Appareil à poncer selon l'une des revendications 6 et 7, caractérisé par le fait que la source de force motrice (40) est un moteur pneumatique.

12. Appareil à poncer selon la revendication 6, caractérisé par le fait que le corps (51) est pourvue d'une poignée (52) ayant un axe perpendiculaire à l'axe du corps (51), et dans la partie extrême libre de cette poignée (52) sont montés un orificie joint (73) pour l'alimentation en air comprimé de la source de force motrice et un orifice de sortie (66) pour l'échappement de l'air de celle-ci.

Fig.2

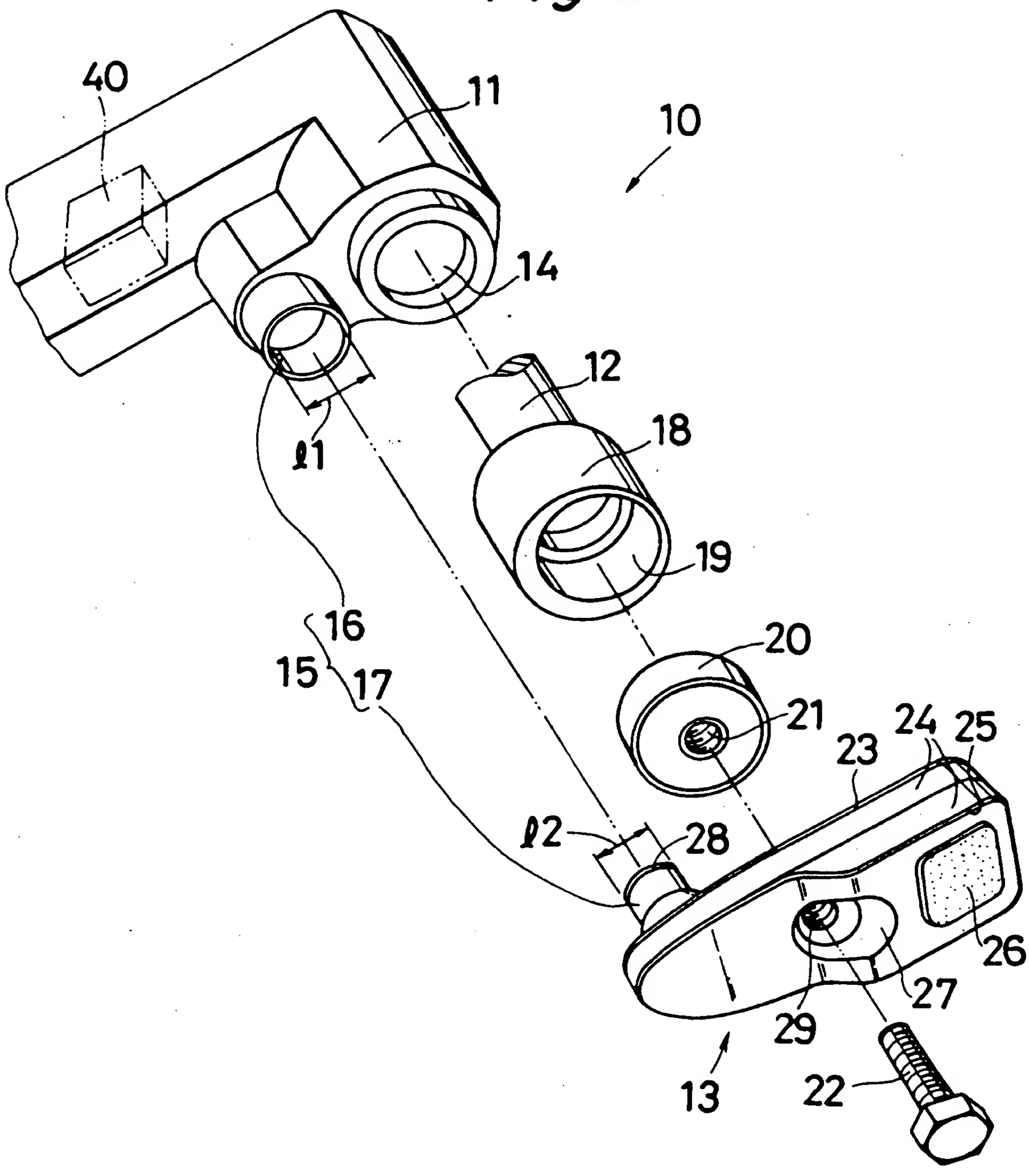

Fig.5

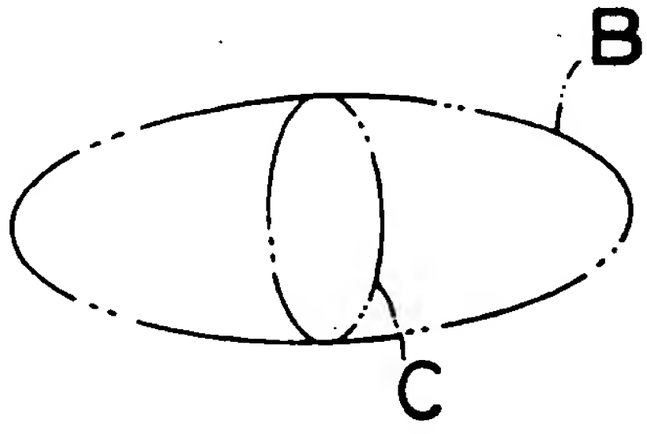

Fig.6

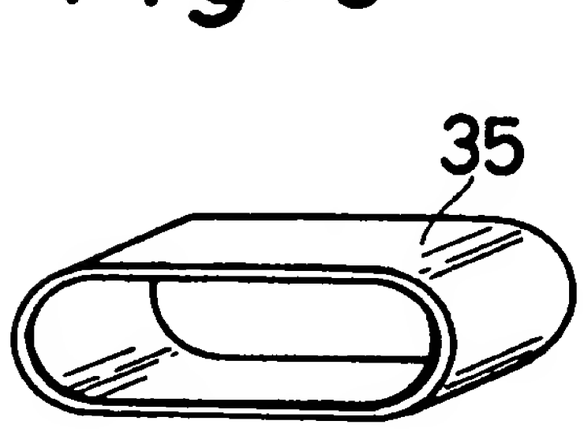

Fig.8

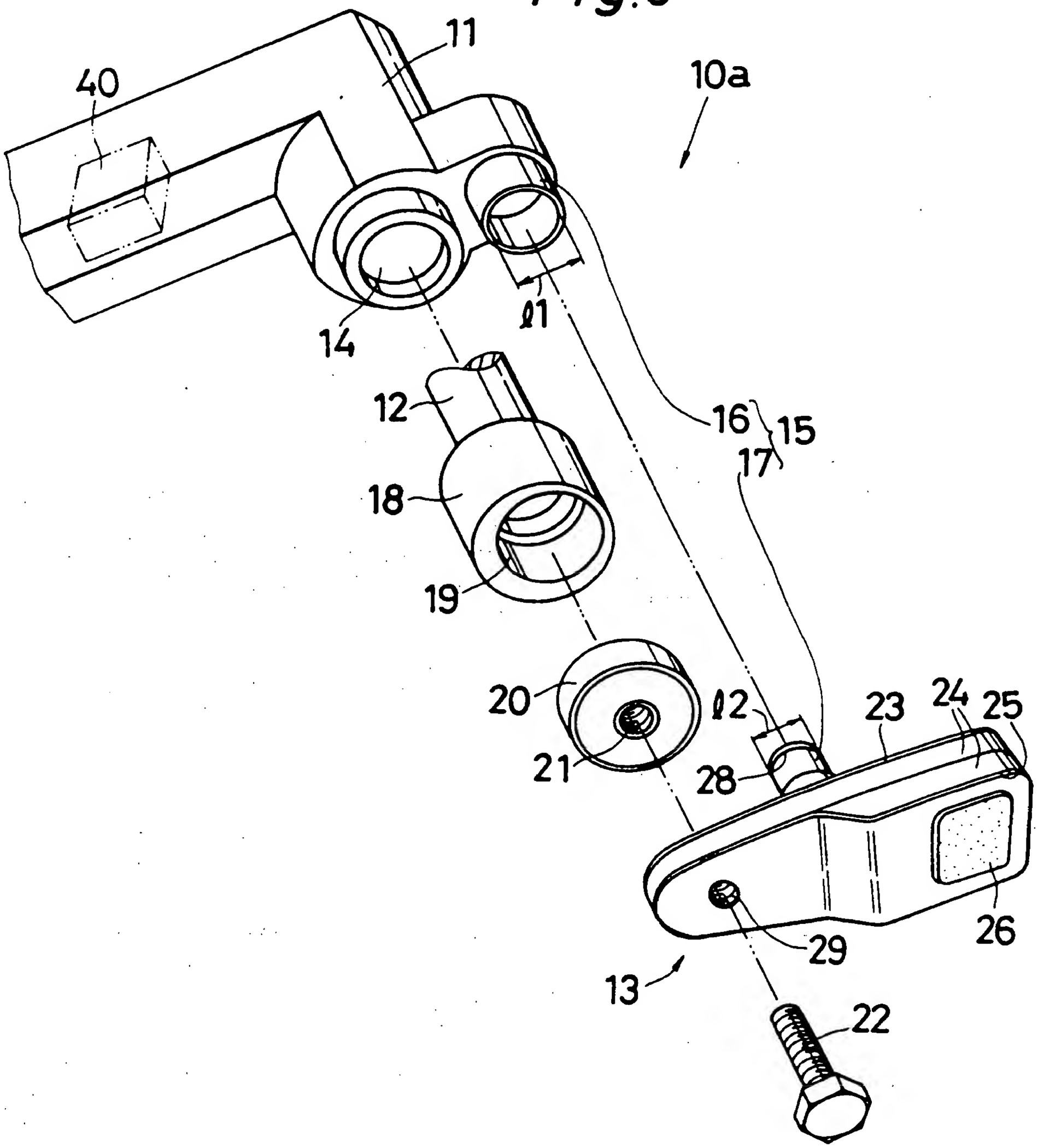

Fig.10

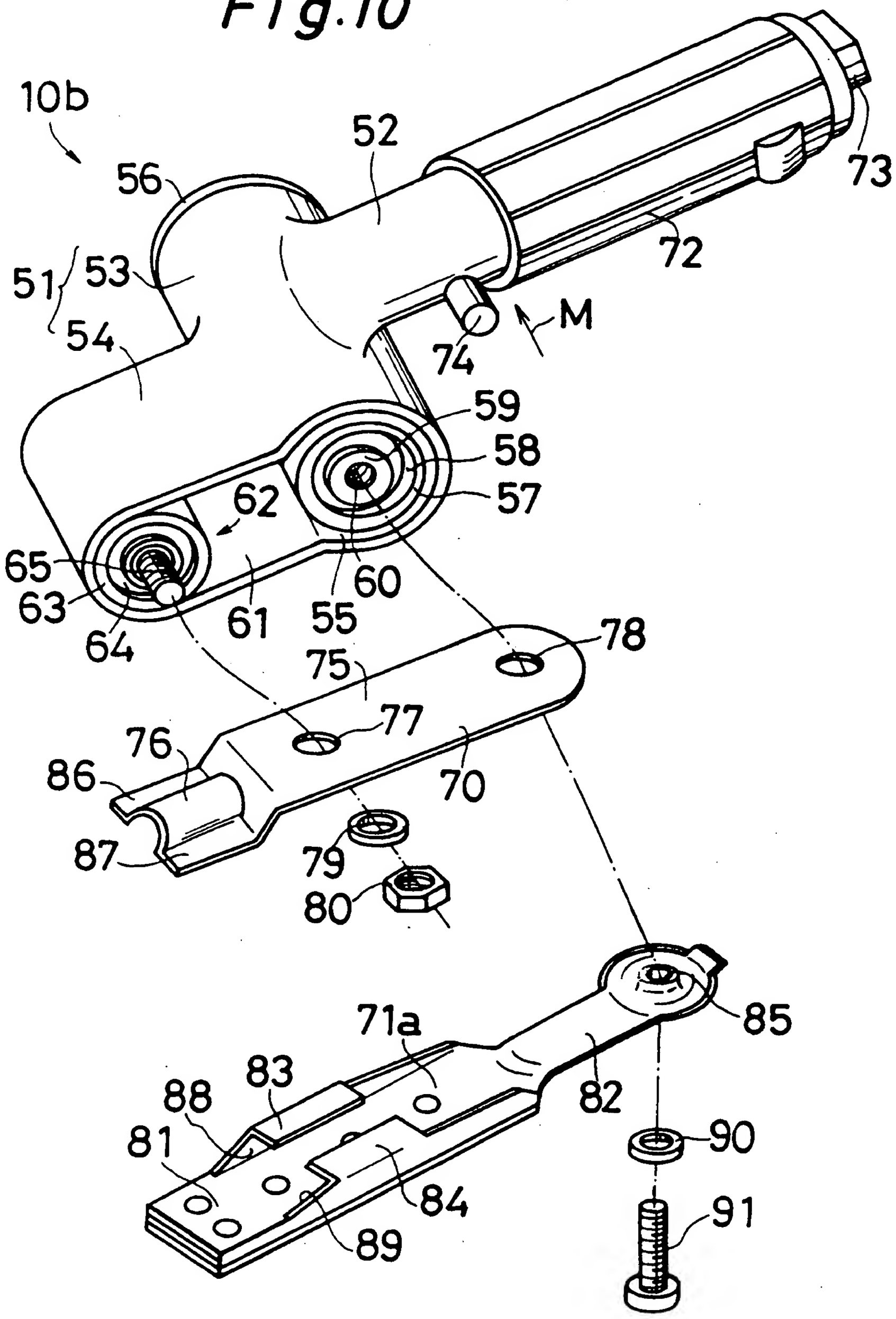
10b
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Fig.13

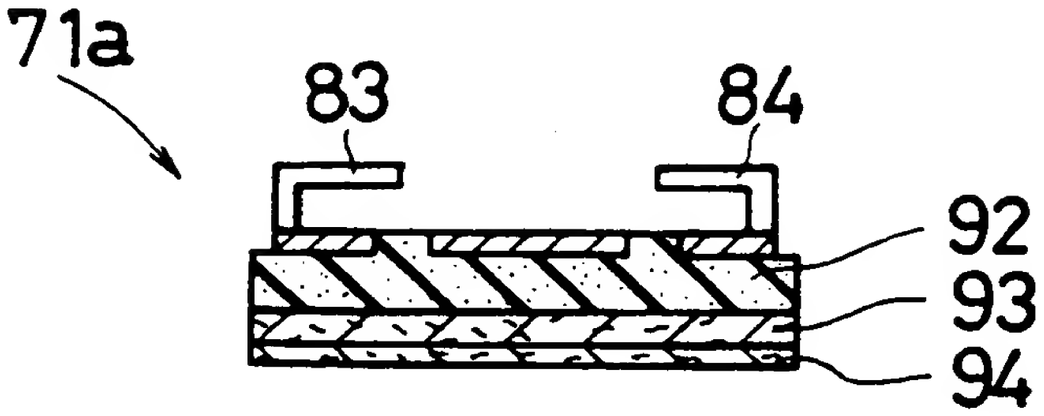

Fig.14

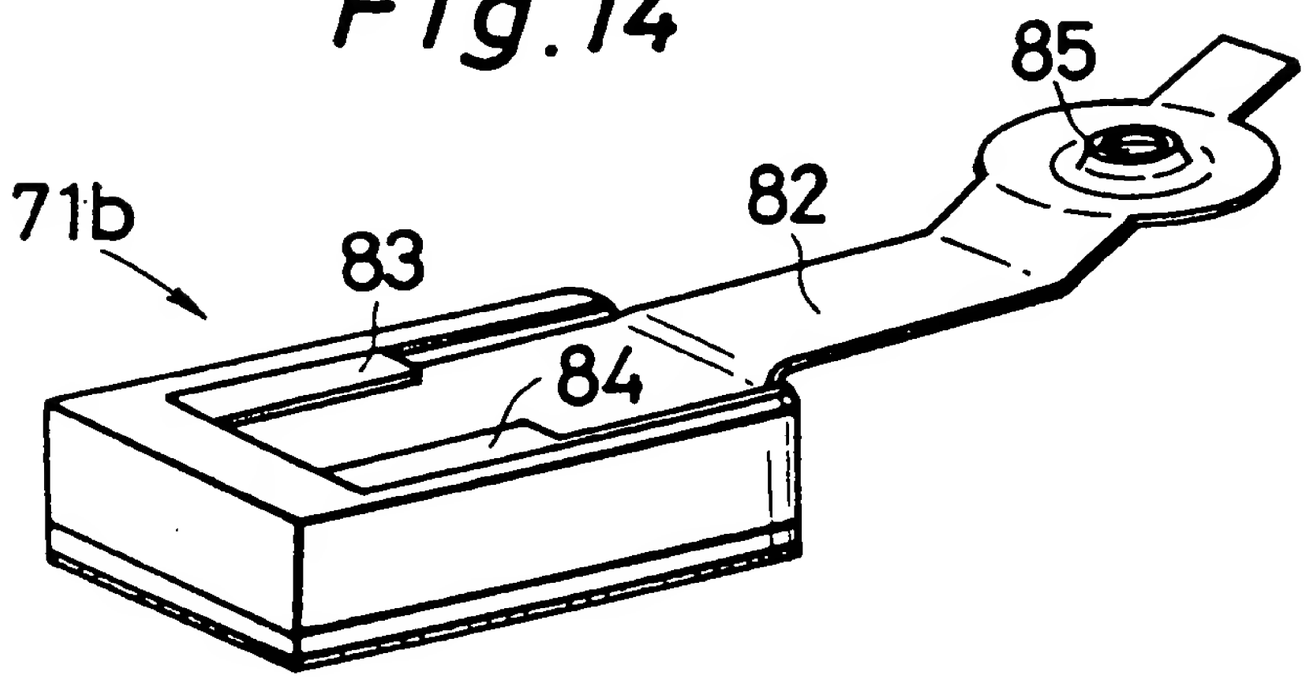

Fig.15